Using a pull mechanism for connecting an Informal Learning Collector with external applications.

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ABSTRACT

The TRAILER Project is an EU funded project in the Life Long Learning program. The project aims to provide a framework for recognition, tagging and acknowledgement of Informal learning activities. Within the scope of this project, a piece of software called Informal learning Collector (ILC) has been developed to act as a binding between informal PLE's and a learning Portfolio. This paper presents an enhancement to the ILC that changes turns it into an active component that pulls data instead of being pushed explicitly by the user.

Categories and Subject Descriptors

D.2.2 [**Design Tools and Techniques**]: User interfaces. D.2.11 [**Software Architectures**]: Patterns – *pull and push mechanisms* H.1.2 [**User/Machine Systems**]: Human Factors H.3.3 [**Information Search and Retrieval**]: Retrieval models H.5.0 [**General**] K.3.1 [Computers and Education]: Computer

Uses in Education|collaborative learning, distance learning

General Terms

Design, Human Factors.

Keywords

Lifelong Learning, Informal Learning, push and pull mechanisms, usability.

1. INTRODUCTION

Recently, there is an increasing interest in the concept of lifelong learning. Within this concept, there are three generally identified types of learning: formal, non-formal and informal learning.

Formal learning is typically provided by an education or training institution. It is structured in terms of learning objectives, time and support and leads to a certification. Formal learning is intentional from the learner's perspective. Examples of formal learning are an Introductory Course to Computer Science or any compulsory education for children.

Non-formal learning occurs in a formal learning environment. The learning takes place in a formal setting such as an educational organization, but is not formally recognized within a curriculum or syllabus framework. Examples of non-formal learning are any extracurricular activity such as an English course at a language school or any training program at work such as writing English skills or negotiation skills.

Informal Learning results from daily life activities related to work, family or leisure. It is not structured in terms of learning objectives, time and support. Informal learning may be intentional but in most cases it is incidental. Informal learning occurs from birth and continues along people lives. Examples of informal learning are a parent teaching their child to swim or a person searching information of a topic into the Internet.

Until recently, informal learning has been ignored and seen as a residual type of learning but this is starting to change. The European Union and UNESCO are working to promote all kinds of learning, giving special attention to informal learning. Informal learning enhances employability [1][2] and helps organizations to develop new skills to compete in a global market.

The gradual recognition of the importance of informal learning has led to the development of a number of projects aimed to manage it. FREE [3], IBAK [4] and TRAILER [5][6] are examples of these projects.

FREE [3] provides an interactive tool for people working with the unemployed such as councilors, tutors, trainers and other professionals. It facilitates these people to improve and gain hard and soft skills to give a better service to the unemployed.

IBAK [4] is a project funded by the EU addressed to those professionals working in the field of lifelong learning. Its main objective is to provide a framework for identifying, assessing and recognizing informally acquired competences.

The TRAILER project [3] [4] is funded by the European Union. Its main objective is to easily identify the informal learning a learner undertakes and provides a set of tools to help represent this learning in a way that will be easier to be recognized and valued by an institution, a company or an organization.

What these projects have in common is that they recollect relative information about the Informal Learning a user performs in order to validate and make visible this type of learning.

In next sections we explain with detail the TRAILER project [3][4] and we identify a point in which the TRAILER can we improved (Section 2). Then we propose a solution for improving the TRAILER project explaining the design decisions and we present the results (Section 3). Finally we present our conclusions (Section 4).

2. THE TRAILER PROJECT

The TRAILER framework (see Figure 1) consists basically of an Informal Learning Collector (ILC) and a personal Portfolio. The ILC is in charge of gather all Informal Learning Activities a learner undertakes and provides an interface to add metadata (tags, comments, activity content, activity type and association with specific competences) to each activity. The Portfolio allows

the learner to make its learning visible, to create activity showcases and to export their informal learning in a formal curriculum.
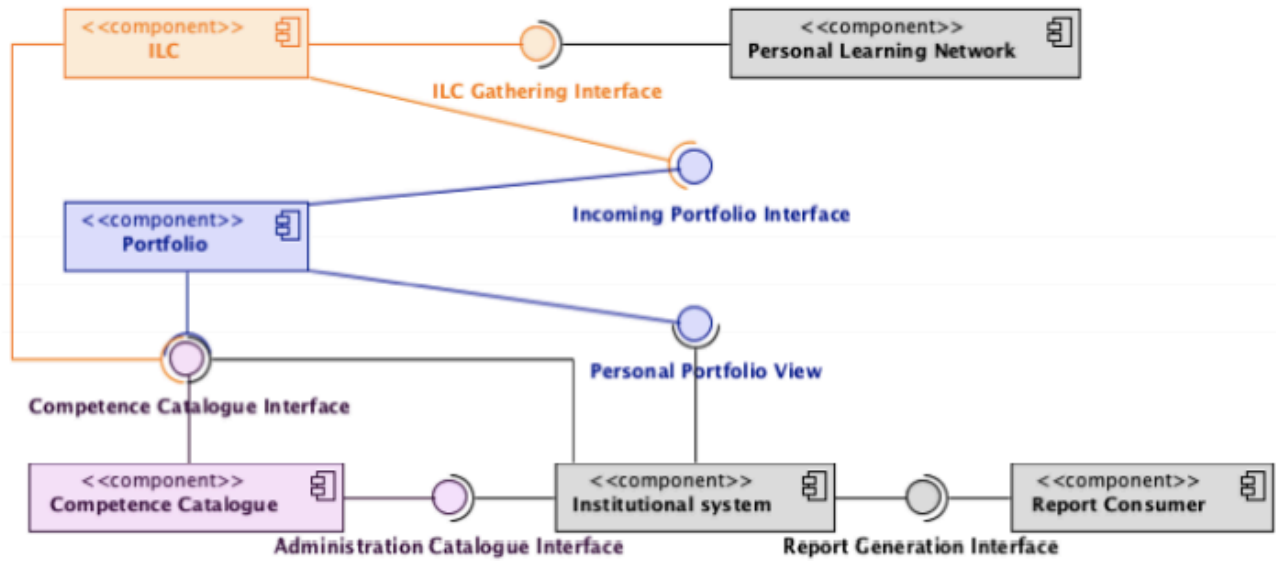

Figure 1. ILC Architecture

The ILC allows sending Informal Learning Activities manually, with a bookmarklet or with a set of web services (see Figure 2). In the manual method the user enters the Informal Learning Activity directly to the ILC using a specific web-based interface. In the bookmarklet method, the user can add activities while he/she is browsing the net. In this method, some data is collected automatically from the net (title, url...) but other data needs to be entered manually (tags…). Finally, the set of web services allow external applications to get user information and register informal learning activities into the ILC. In order to ensure as much connectivity as possible, ILC supports the most common communication protocols.

some negative user feedback related to this issue. Mainly, they found that entering Informal Learning Activities using the methods mentioned above was annoying as this action required a change in the context of their daily activities. Users found that the bookmarklet method was slightly better than the manual one because some data was registered automatically from the net. They agreed that the bookmarklet was their preferred way for introducing Informal Learning Activities into the ILC. In fact, from the usage statistics we have gathered, we've seen that 78% of Informal Learning Activities were sent using the bookmarklet method while only a 22% of Informal Learning Activities were sent manually (see Figure 3).
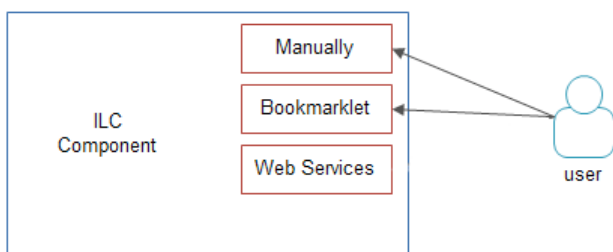

Figure 2. Available methods for registering Informal Learning Activities

From the above mentioned methods, the first two are push-based mechanisms while the third is a pull mechanism. With the push mechanism, the user has the responsibility to initiate and perform the data entry action, meanwhile with the pull mechanism, an external application notifies that the user has performed some activities in some external application, and the ILC must gather activities information from the external application.

We've noticed that the push methods (manual and bookmarklet) are disrupting the users' current work activity. Also we received
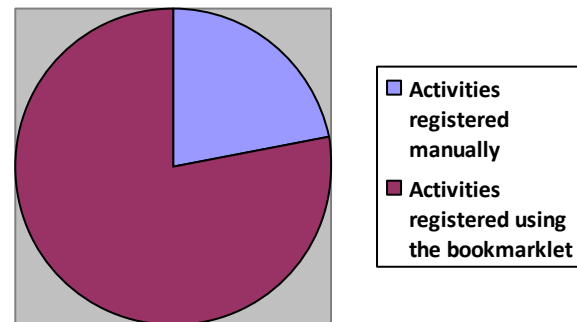

Figure 3. Percentage use of push mechanisms

We also noted that some users were asking for more for importing Informal Learning Activities saved in other external applications into the ILC. That is, to add mechanisms to allow the ILC to connect to external applications, get the user saved data and register this data as an Informal Learning Activity. In short,

this is a pull based mechanism that can be implemented using the set of web services provided by the ILC.

3. CONNECTING THE ILC WITH EXTERNAL APPLICATIONS.

In our effort to improve the usability of the ILC, we considered adding a pull method for introducing activities. We studied the possibility to integrate a large set of external applications, extract data concerning knowledge activities from these applications and send them to the ILC as an Informal Learning Activity. This is a pull mechanism for registering data.

The idea of a pull mechanism is that the application retrieves information rather than asking the user to introduce it. This information is retrieved from other external applications. For security reasons, the user has to authorize the application to have access to any other external application. This must be done once for each external application.

While considering such an improvement for the ILC it is important to note the following issues related with how the data extraction from the external application is going to be done:

- First, and probably the most importantly, we need to decide which applications can be considered as data providers for Informal Learning Activities.

- Second is to decide which data from the external application is relevant to Informal Learning Activities and therefore should be recollected by the ILC.

- Third is to decide the granularity of the data recollected from the external application. That is, with which detail level the data is going to be recollected.

- And finally, is to decide how the data from the external application is going to be matched with the required ILC data for an Informal Learning Activity. It is important to note here that the matching will not always be a direct matching and that for some data or applications aggregation or simplification would be necessary.

3.1 Connecting with Pocket

We have designed a first prototype of a pull strategy for entering ILAs by connecting the ILC with an external application called Pocket.

Pocket is an application for saving articles and web pages in order to read them later. Currently, Pocket allows saving articles, videos or images from the web, tag, search and share them. It is available for the major operating systems (iOs, Android, etc.) and web browsers (Chrome, Firefox, Safari, etc.)

A stored resource (i.e articles, videos, etc) is called item in Pocket. For each item, Pocket application saves the title, the URL and a short description extracted from the net. The user is able to add tags, mark as favorite or mark as read any item of Pocket in order to better manage its reading list.

We have developed a new component integrated into the ILC architecture called "Pocket to ILC" (see Figure 4). It uses the set of web services to pull Informal Learning Activities extracted from the Pocket application to the ILC. With this new component, when the user enters into the ILC, the system displays a list of items extracted from his/her Pocket account. Then, the user can mark all the items he/she wants to send to the ILC. Once the user has selected all the items he/she wants to send to the ILC, the user

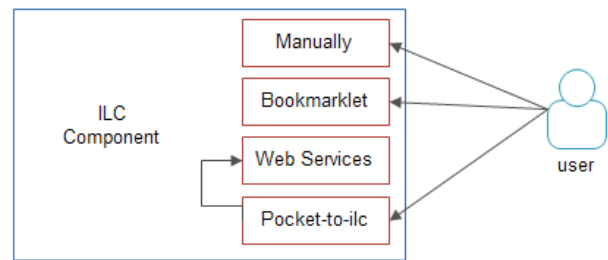can send them as Informal Learning Activities and the ILC saves all the activities.

Figure 4. Pocket to ILC integrated method for sending Informal Learning Activities

In our solution for this first experience we have taken the following decisions related to the data extraction from the external application:

- We consider Pocket as an external provider for Informal Learning Activities. We consider that the activity a user performs while navigating the net is an Informal Learning Activity. Therefore, the resource managed by Pocket, which results from the user's navigation activity is an Informal Learning Activity.

- The Pocket to ILC component gathers the same basic information Pocket collects in each their items: Title, URL and Tags. As we have explained in the point above, we consider as an Informal Learning Activity the activity a user performs while navigating the net. Then we recollect the Pocket information of each item related to the navigation activity which at the same time is used to easily identify and recover any of the Informal Learning Activities of the user.

- We decided to gather the information as stored in the Pocket application without additional aggregation or simplification. Our component does not consider additional information of a Pocket item such as description, observations, favorite or read status. The main reason of this decision is because such comments and annotations may be different from a learning point of view (ILC) than from a simple recorder of Internet resources (webpages, images, videos, etc.) like Pocket. Also, with the ILC interface the users can make their own annotations and descriptions for each Informal Learning Activity.

- Finally, our component obtains the basic information from a Pocket item, which it matches perfectly to the required format of the basic information of an Informal Learning Activity stored in the ILC.

3.2 Results

In order to get user's perception about this new way to register information into the ILC (pulling mechanism), we have run a pilot. We have released the developed component, the Pocket to ILC, and asked the users, during one week, to use the ILC for registering Informal Learning Activities. They had available the two push methods (manually and bookmarklet) as well as the pull method (the Pocket to ILC component) for introducing their Informal Learning Activities.

After that week, we conducted personal guided interviews the user feedback for the new pulling method. All users valued positively

the pull mechanism. In fact, when we asked users to rate the new component on a scale of 1 to 10 we get an 8.2 of rating average (see Figure 5).

In regard to the work disruption, all users found that the new method for entering Informal Learning Activities was less disrupting. In fact, when we asked users to value on a scale of 1 to 10, being 1 very disrupting and 10 no disrupting, we get an average of 7.6 (See Figure 5).
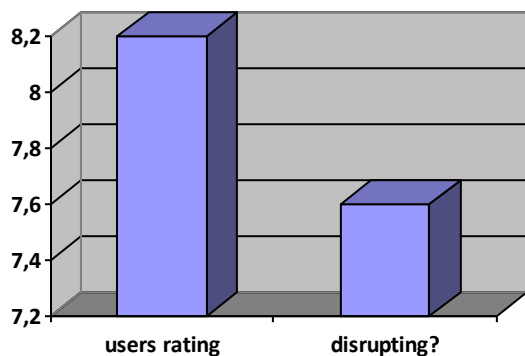

Figure 5. Average of users rating

Other comments received form users where:

- Being notified about Informal Learning Activities by the ILC is a good improvement: "… I would rather prefer to enter into the ILC and get a list of Informal Learning Activities, check the ones I want to send as learning… for me is less work"

- The new method is less tedious: "I save resources for reading them later with Pocket. All I read is there. So, if the ILC lists me my Pocket resources I'm almost done with few clicks. Easy."

- A more automatic method: "I don't have to look for Informal Learning Activities I've done anymore. ILC just lists me my learning activities. Of course they should be saved in Pocket, but before this new functionality I had to enter most of them manually.

4. CONCLUSIONS

Historically, informal learning has been undervalued and seen as a residual concept: a type of learning that is not formal neither non-formal. Therefore, informal learning has never been treated as a type of learning deserving to be managed or validated. Increasingly, organizations are being aware that the informal learning is essential in a global market as this learning is translated in skills, competences and know-how of their workforce. Also UNESCO efforts are to give visibility to the informal learning and to propose frameworks for validating this knowledge.

These reasons have led to the development of several tools in order to manage informal learning. One of them is the TRAILER project.

We have seen that the TRAILER project [13] [14] facilitates the identification of informal learning activities but that can be still improved in usability terms. At first, the main way users had for adding Informal Learning Activities was with two methods based on push mechanisms. These methods were useful, but we have

seen that the users prefer more guided and automatic methods. In order to lighten the tasks related to introducing Informal Learning Activities into the ILC we proposed to add a new method, using the set of web services. This new method was a pull mechanism allowing to get data from other external applications. Then the user only has to select which Informal Learning Activities recollected from other applications wants to save into the ILC. We decided to implement a first pilot connecting with the Pocket applications in order to test this new method.

According to the feedback received from the users we concluded that adding such a mechanism improves the ILC usability. Users are more willing to use the ILC when the data entry is simplified and requires less effort and time for them.

This new pulling mechanism is useful but opens new questions and problems that should be addressed:

- To be able to notify the user the total number of Informal Learning Activities available; this mechanism should be implemented for a large list of external applications. It is difficult to known, a priori, which other applications individuals are using in their informal learning process.

- Each external application stores different data and with different granularity. The matching between external application data and ILC data could not be so direct like in the Pocket case.

- It should be studied which data is going to be recovered from the external application, obtaining directly from the external application only those activities that are relevant for the ILC portfolio.

Acknowledgment

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